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## CHAPTER 4 CORRIDOR ASSESSMENT

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Many land uses and activities in the Lower Merrimack River corridor are limited by physical characteristics, which have been discussed in Chapter 3 – Corridor Resources. Also important in determining the range of potential uses of a given site are the sociopolitical characteristics defined by the set of existing regulatory conditions, community vision, and expected values of different areas. This Chapter discusses the external sets of constraints operating within the Lower Merrimack River corridor, and their effects on the existing and potential uses and management of the corridor.

### 4.1 Regulatory Framework

#### 4.1.1 Regulations

Federal, state, and municipal regulations are often the most conspicuous management tools available to a community and its resources, often having great impact on how resources are utilized or affected over time. Regulatory standards, however, are not immutable, and often change over time as needs and desired outcomes change. It is therefore important for stakeholders to remain abreast of existing regulations at all levels of government in order to fully understand the scope, intent, and reach of particular regulations, rules, and ordinances as they relate to specific resources and to other existing or proposed regulations. The following sections discuss some of the more prominent regulatory mechanisms that are in place to safeguard and regulate the Lower Merrimack River.

##### 4.1.1.a New Hampshire Rivers Management and Protection Program

The Lower Merrimack River is designated under the Rivers Management and Protection Program as a Community River. RSA 483:9-b provides for the protection of rivers or river segments holding the community river designation, and includes the following protections:

- Construction of new dams for public water supply, flood control or hydroelectric energy production purposes may be allowed if such construction is consistent with management and protection of the resources for which the river or segment is designated.
- Construction, operation, and/or maintenance of new hydroelectric power facilities are allowed at existing or breached dams provided that:
  - (a) The operational mode of any proposed facility shall be run-of-the-river, with project outflow equal to project inflow on an instantaneous basis and the project does not significantly alter the natural flow characteristics of the river; and
  - (b) The proposed facility does not provide for diversion of the river or segment above or below the existing dam for a significant distance; and
  - (c) The height of the impoundment is constant and, for existing or breached dams, is not raised above the maximum historic level of impoundment at that site.
- Interbasin transfers of water from a designated community river or segment shall not be permitted.
- No new channel alteration activities shall be permitted which interfere with or alter the natural flow characteristics of the river or segment or which adversely affect the resources for which the river or segment is designated. However, such channel alterations may be approved when necessary for the construction, repair, or maintenance of public water supply intake facilities in the river or river corridor.
- The use of native vegetation to stabilize the streambank of designated community rivers is encouraged.

- A protected instream flow level shall be established for each designated community river or segment and any upstream impoundment or diversion facility which may affect the natural flow characteristics of such river or segment pursuant to RSA 483-A:9-c.
- Water quality shall be restored or maintained at least at the Class B level. Significant adverse impacts on water quality or other instream public uses shall not be permitted.
- The department shall review and consider adopted local river corridor management plans prior to issuing any water discharge permit, terrain alteration permit, or wetlands permit (in accordance with RSA 485-A:13, RSA 485-A:17 or RSA 482-A).
- Any new solid waste storage or treatment facility shall be set back a minimum of 250 feet from the normal high water mark of and shall be screened with a vegetative or other natural barrier to minimize visual impact.
- Any motorized watercraft operating within 150 feet of the shoreline of a designated community river or segment shall travel at the slowest possible speed necessary to maintain steerage way, but at no time shall exceed six miles per hour.

#### **4.1.1.b Alteration of Terrain Permit:**

Alteration-of-Terrain (AOT) permits are designed to protect New Hampshire surface waters by minimizing soil erosion and controlling stormwater runoff, as required by RSA 485-A:17. Generally an AOT permit is needed before initiating any ground-disturbing activities to a contiguous area 100,000 square feet (2.3 acres) or more in size or 50,000 square feet in size if the location is within 250 feet of a lake, great pond, fourth-order stream, or designated river as defined in RSA 483-B, the Comprehensive Shoreland Protection Act. Some general provisions for AOT permits apply:

- For a single family subdivision in which the lot development will not be carried out at the same time as roadway construction, (i.e., the roadway and other work within the right-of-way will be completed and stabilized prior to grading the lots), the only item considered in calculation of disturbed area is the roadway. For example, for a 50 foot right-of-way, 2,000 linear feet of roadway would create an area of disturbance of 100,000 square feet, thus requiring a Site Specific permit.
- For other types of developments and earth removal operations, a contiguous earth disturbance of 100,000 square feet including building area, parking, driveways, roadways, utility construction, landscaping and borrow areas would require a Site Specific permit.
- For earth removal operations in existence on the effective date of the regulations, May 4, 1981, the "footprint" of the area of disturbance at that time is considered to be grandfathered, but any contiguous disturbance of 100,000 square feet or more outside that footprint requires a Site Specific permit.
- In addition to the above, RSA 483-B, the "Comprehensive Shoreland Protection Act," requires that any person intending to conduct an activity within the 250 feet of the protected shoreland resulting in a contiguous disturbed area exceeding 50,000 square feet to first obtain a permit.

#### **4.1.1.c Comprehensive Shoreland Protection Act**

Chapter 483-B of the New Hampshire Statutes contains the New Hampshire Comprehensive Shoreland Protection Act (CSPA), which is designed to protect the fragile and valuable resources adjacent to public surface waters. The CSPA contains minimum standards necessary to protect these public surface waters and their environs and serves to:

- Maintain safe and healthful conditions.
- Provide for wise utilization of water and related land resources.
- Prevent water pollution.

- Protect aquatic life and habitats.
- Protect buildings and lands from the effects of flooding and erosion.
- Protect archaeological and historic resources.
- Protect commercial fishing and industry.
- Protect wetlands.
- Control land uses, building sites, and placement of structures.
- Conserve shoreline cover.
- Preserve public waterbodies in their natural state.
- Promote wildlife habitat, scenic beauty, and scientific study.
- Protect public use of surface waters.
- Conserve natural beauty and open spaces.
- Anticipate and respond to the impacts of development in shoreland areas.
- Provide for economic development in proximity to public waters.

Further details on the provisions, allowances, and prohibitions contained within the CSPA can be found within the subparagraphs of Chapter 483-B. Recent modifications to the implementation and structure of the CSPA will go into effect in April 1, 2008.

#### 4.1.2 Ordinances

Relative to corridor resources, there are a number of planning documents specified through municipal land use ordinances and zoning regulations in each of the four communities that relate to riparian and land management of the surrounding resources. Table 10 below shows the pertinent municipal ordinances and zoning regulations, and where in the municipal code they can be found, related to corridor management in each of the adjacent towns. It should be noted, however, that while one section of ordinance may deal specifically with a particular resource of interest, that resource may also appear in several other locations in the municipal ordinance; this table only references the predominant sections where information on a resource’s allowable uses may be found.

**Table 10: Municipal Ordinances Related to River Corridor Management Enacted within the Lower Merrimack River Corridor Communities**

| <b>Management Category</b> | <b>Hudson</b>                                             | <b>Litchfield</b>                                      | <b>Merrimack</b>                                                    | <b>Nashua</b>                                                        |
|----------------------------|-----------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------|
| Wetlands                   | CH 334, Article IX - <i>Wetland Conservation District</i> | Section 1200 - <i>Wetlands Conservation District</i>   | 2.02.7 - <i>Wetland Conservation District - Permitted Uses</i>      | Chapter 16, Article VIII - <i>Wetlands</i>                           |
| Floodplains                | Chapter 218 - <i>Flood Damage Prevention</i>              | Section 1100 - <i>Floodplain Conservation District</i> | 2.02.8 - <i>Flood Hazard Conservation District - Permitted Uses</i> | Chapter 16, Article VII, Division 18 - <i>Floodplain Development</i> |
| Aquifers and Groundwater   | n/a                                                       | Section 1250 - <i>Aquifer Protection District</i>      | 2.01.11 - <i>Aquifer Conservation District</i>                      | n/a                                                                  |
| Shoreland Protection       | n/a                                                       | n/a                                                    | 2.02.12 - <i>Shoreland Protection District</i>                      | n/a                                                                  |
| Wastewater Treatment       | n/a                                                       | n/a                                                    | n/a                                                                 | Chapter 18 - <i>Sewage Disposal</i>                                  |
| Wellhead Protection        | n/a                                                       | n/a                                                    | 2.01.11.D.2 - <i>Prohibited Uses, Wellhead Protection Areas</i>     | Chapter 16, Article X - <i>Water Supply Protection District</i>      |

**Table 10: Municipal Ordinances Related to River Corridor Management Enacted within the Lower Merrimack River Corridor Communities**

| <b>Management Category</b> | <b>Hudson</b> | <b>Litchfield</b> | <b>Merrimack</b> | <b>Nashua</b>                                                                  |
|----------------------------|---------------|-------------------|------------------|--------------------------------------------------------------------------------|
| Stormwater Management      | n/a           | n/a               | n/a              | Chapter 16 Article IV, Section 16-145 – <i>Stormwater Management Standards</i> |
| Erosion and Sedimentation  | n/a           | n/a               | n/a              | n/a                                                                            |
| Watershed Protection       | n/a           | n/a               | n/a              | n/a                                                                            |

### 4.1.3 Subdivision / Site Plan Review Regulations

Each corridor community has specified a list of required information which must be submitted for approval for a subdivision processes and/or nonresidential or multi-family dwelling development. Site plan review sets forth the specific information which must be submitted during the review process, including application requirements and design standards. The breadth of these regulations sets the scope of information submitted to decision makers on individual properties and developments, and property owners and developers alike may find it useful to understand the application and approval processes within and between municipalities.

### 4.1.4 Other Guidance

#### 4.1.4.a Lower Merrimack River Local Advisory Committee

The Lower Merrimack River Local Advisory Committee (LMRLAC) is the locally appointed river management advisory committee for the Lower Merrimack River. Committee members are nominated by the local governing bodies of Hudson, Litchfield, Nashua, and Merrimack. The Commissioner of the NH Department of Environmental Services (Commissioner) appoints at least one person from each municipality to the local river management advisory committee, and each committee must be composed of at least seven members who represent a broad range of interests in the vicinity of the designated river or segment. These interests shall include, but are not limited to, local government, business, conservation interests, recreation, agriculture, and riparian landowners. If an interest is not represented by the local governing bodies' nominations, the Commissioner may appoint a member from the vicinity of the designated river or segment to the local river management advisory committee who will represent that interest. Each member serves a term of three years.

LMRLAC's duties include advising the Commissioner and municipalities on matters pertaining to the management of the Lower Merrimack River. In turn, municipal officials, boards, and agencies shall inform LMRLAC of any actions which they are considering in managing and regulating activities within designated river corridors. LMRLAC also reviews federal, state, or local governmental plans to approve, license, fund or construct facilities that would alter the resource values and characteristics for which the river or segment is designated. LMRLAC has already developed a Development Review Checklist to assist and guide the application review process, providing a standard template from which all applications are initially evaluated. Annually, LMRLAC reviews and comments on permit applications taking place within the Lower Merrimack River corridor. Formal review of State permit applications is common, while other permits originate at the municipal level. LMRLAC is also responsible for reporting

annually to the Department of Environmental Services Commissioner on the status of compliance with federal and state laws and regulations, local ordinances, and plans relevant to the designated river or segment and corridor.

LMRLAC is also charged with the development of a local river corridor management plan, which may be adopted by the representative municipal Planning Board pursuant to RSA 675:6 as an adjunct to the local master plan. Advisory Committees are encouraged to seek such adoption from the Planning Boards, since the plan does not have any regulatory authority unless adopted by municipal master plans.

#### **4.1.4.b Guidelines for Naturalized River Channel Design and Bank Stabilization**

These guidelines (NHDES and NHDOT 2007), produced jointly by the New Hampshire Department of Environmental Services and the New Hampshire Department of Transportation, provide a project classification system that can be used to determine whether a project is routine, moderate, or comprehensive which then can guide the selection of designs for bank stabilization methods. The guidelines also provide a description of the primary types of river channel distress to aid in accurate problem identification. Also provided is a project monitoring and evaluation tool which can be used in the monitoring phase of project work.

#### **4.1.4.c Innovative Land Use Planning Techniques: A Handbook for Sustainable Development**

To address the need for guidance and technical assistance on Innovative Land Use Controls authorized by RSA 674:21, the New Hampshire Regional Environmental Planning Program (REPP) has produced a guide with model ordinances and regulations on a number of innovative land use techniques which consider the following topic areas:

- Lot Size Averaging
- Feature-based Density
- Village Plan Alternative Subdivision
- Inclusionary Housing
- Stormwater Management
- Steep Slopes and Ridgeline Protection
- Wildlife Habitat Management
- Energy Efficient Development
- Transfer of Development Rights
- Conservation Subdivision
- Infill Development
- Growth Boundaries
- Wetlands
- Drinking Water
- Shoreland and Riparian Areas
- Floodplains
- Erosion and Sediment Control
- Transit-oriented Development
- Livable/Walkable Design
- Access Management
- Dark Skies Lighting
- Landscaping Regulations

More information on the content of these chapters can be found at the NHDES website: <http://www.des.state.nh.us/REPP/index.asp?go=ilupth>. These chapters provide municipalities with new techniques and tools for achieving local master plan objectives through changes in land use ordinances and zoning regulations.

#### **4.1.4.d New Hampshire Wildlife Action Plan**

The New Hampshire Fish and Game Department has worked to create the state's first Wildlife Action Plan. The plan provides New Hampshire decision-makers with tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. The plan incorporates statewide data such as species occurrence records into a Geographic Information System

which contains wildlife species profiles, profiles of important habitats, and strategies for habitat conservation. Existing wildlife management activities will also be incorporated into the database. Since river corridor areas often contain important wildlife habitat, the Wildlife Action Plan will be a useful resource in evaluating critical management needs within the Lower Merrimack River corridor. More information on the NH Wildlife Action Plan can be found online at the NH Fish and Game Department's website at: [http://www.wildlife.state.nh.us/Wildlife/wildlife\\_plan.htm](http://www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm)

## 4.2 Watershed Audit Findings

A Watershed Audit is often used to establish the baseline of existing watershed protection strategies present in a given community. In 2006, watershed audits were administered to knowledgeable municipal staff in each of the four Merrimack River corridor communities: Litchfield, Merrimack, Nashua, and Hudson. Each audit measures the extent to which eight watershed protection tools (watershed planning, land conservation, aquatic buffers, better site design, erosion and sediment control, stormwater management, non-stormwater discharges, and watershed stewardship programs) are enacted in the community. The results and themes of these audits, arranged by the watershed protection tools of interest, are discussed in Table 11 below. Copies of the actual audits are included at the end of the corridor plan in Appendix 2.

|                                                                                                                                                                                                                                        |                                                                                                                                                                              |                                                                                                                                                                                                                                                            |                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>TOOL 1: WATERSHED PLANNING:</b> Watershed planning involves the creation of regulatory measures and planning methods that limit impervious cover and redirect development to the most appropriate and least sensitive areas.</p> | <p><b>TOOL 2: LAND CONSERVATION:</b> Land conservation includes programs to conserve underdeveloped, biologically sensitive, or areas of cultural or historic importance</p> | <p><b>TOOL 3: VEGETATIVE BUFFERS:</b> Vegetative buffers help protect aquatic ecosystems by requiring development to occur at a removed distance from shoreland areas, providing a natural shield from potentially hazardous activities or substances.</p> | <p><b>TOOL 4: BETTER SITE DESIGN:</b> Better site design includes local ordinances and codes that can reduce impervious cover and redirect runoff through design decisions.</p>          |
| <p><b>TOOL 5: EROSION AND SEDIMENT CONTROL:</b> Erosion and sediment controls include both physical mechanisms and regulatory practices to prevent erosion.</p>                                                                        | <p><b>TOOL 6: STORMWATER MANAGEMENT:</b> Stormwater management includes all structural practices that help mitigate the impacts of stormwater runoff into waterbodies.</p>   | <p><b>TOOL 7: CONTROL OF POINT DISCHARGES:</b> Controlling site-specific pollutant sources such as sanitary waste and deicing chemicals which can enter surface waters through runoff or direct discharges.</p>                                            | <p><b>TOOL 8: WATERSHED STEWARDSHIP:</b> Watershed stewardship programs generally foster human behavior that prevents or reduces pollution over a range of land uses and activities.</p> |

| <b>Table 11: Watershed Audit Findings and Comparisons for Hudson, Nashua, Merrimack, and Litchfield</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                     |                               |                                                                       |                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------|---------------------------------|
| <b>Mechanism and Activity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Nashua</b>                                                                                       | <b>Hudson</b>                 | <b>Merrimack</b>                                                      | <b>Litchfield</b>               |
| <b>WATERSHED PLANNING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                     |                               |                                                                       |                                 |
| Conservation Easements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes                                                                                                 | Yes                           | Yes                                                                   | Yes                             |
| Land Acquisition Programs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Yes                                                                                                 | Yes                           | Yes                                                                   | Yes                             |
| Infill Development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes                                                                                                 | Yes                           | No                                                                    | Yes                             |
| Community Redevelopment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Yes                                                                                                 | Yes                           | No                                                                    | Yes                             |
| Infrastructure Extension Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | No                                                                                                  | Yes                           | No                                                                    | No                              |
| Transfer of Development Rights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No                                                                                                  | Yes                           | No                                                                    | No                              |
| <b>LAND CONSERVATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                     |                               |                                                                       |                                 |
| Cultural and Historic Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Progressive                                                                                         | Encouraged                    | Encouraged                                                            | Progressive                     |
| Agricultural Land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Absent                                                                                              | Encouraged                    | Absent                                                                | Encouraged                      |
| Critical Habitat Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Absent                                                                                              | Encouraged                    | Absent                                                                | Progressive                     |
| Wetlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Required                                                                                            | Required                      | Required                                                              | Required                        |
| Steep Slopes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Required                                                                                            | Required                      | Required                                                              | Required                        |
| Forested Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Absent                                                                                              | Encouraged                    | Absent                                                                | Encouraged                      |
| Stream Channels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Required                                                                                            | Required                      | Required                                                              | Required                        |
| <b>AQUATIC BUFFERS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                     |                               |                                                                       |                                 |
| Stream Buffers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Required:<br>75' for Prime Wetlands <sup>1</sup> and 40' for Critical Wetlands <sup>2</sup>         | Required (50' no disturbance) | Required (25' no cut buffer, 40' bldg setback, 50' shoreland setback) | Required (50' no disturbance)   |
| <p><i>Nashua Prime Wetlands<sup>1</sup> = Merrimack River, Nashua River, Salmon Brook, Pennichuck Brook, Bowers Pond, Harris Pond, Holts Pond, Pennichuck Pond, Supply Pond, Lovewell's Pond, Horse Pond, Old Ridge Road wetlands, Nashua Canal, and Nashua Cove.</i></p> <p><i>Nashua Critical Wetlands<sup>2</sup> = Boire Brook, Coburn Pond, Cold Brook, Colerain Brook, Hales Brook, Harris Brook, Hassells Brook, Lincoln Brook, Lyle Reed Brook, Mill Pond, Muddy Brook, Old Maid's Brook, Round Pond, Spectacle Brook, Spit Brook, Trout Brook, Sandy Pond.</i></p> |                                                                                                     |                               |                                                                       |                                 |
| Wetlands Buffers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Primary = 75'<br>Critical = 40'<br>3,000-9,000 sq ft =20<br>>9,000 sq ft = 40'<br>Vernal Pools =20' | 50' wetland                   | 25' buffer<br>40' setback                                             | 50' wetland<br>200' vernal pool |
| Riparian Cover                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Required                                                                                            | Required                      | Absent                                                                | Absent                          |
| <b>BETTER SITE DESIGN (REDUCED IMPERVIOUS SURFACES)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                     |                               |                                                                       |                                 |
| Minimum Road Widths in Low Density Neighborhoods (< 500 ADT)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 28 ft                                                                                               | 23-26 ft                      | 23-26 ft                                                              | 23-26 ft                        |
| Minimum Right-of-Way for Residential Streets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50 ft                                                                                               | 50 ft                         | 50 ft                                                                 | 50 ft                           |
| Cul-de-Sac Minimum Radius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50 ft<br>(30 ft if no future extension capacity)                                                    | 50 ft                         | 50 ft                                                                 | 50 ft                           |
| Curb and Gutter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Required                                                                                            | Required                      | Required                                                              | Required                        |

**Table 11: Watershed Audit Findings and Comparisons for Hudson, Nashua, Merrimack, and Litchfield**

| <b>Mechanism and Activity</b>                                         | <b>Nashua</b>                 | <b>Hudson</b>                 | <b>Merrimack</b>              | <b>Litchfield</b>             |
|-----------------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Parking                                                               |                               |                               |                               |                               |
| <i>Minimum Parking Spaces</i>                                         |                               |                               |                               |                               |
| Office Uses                                                           | 3/1000 ft <sup>2</sup>        | 3/1000 ft <sup>2</sup>        | 3.1-3.5/1000 ft <sup>2</sup>  | 3.1-3.5/1000 ft <sup>2</sup>  |
| Commercial Uses                                                       | 4/1000 ft <sup>2</sup>        | 4/1000 ft <sup>2</sup>        | 4.1-5.5/1000 ft <sup>2</sup>  | 5.5/1000 ft <sup>2</sup>      |
| Residential Uses                                                      | 2/unit                        | 2/unit                        | Absent                        | 2/unit                        |
| <i>Shared Parking</i>                                                 | Encouraged                    | Encouraged                    | Encouraged                    | Absent                        |
| <i>Compact Car Parking</i>                                            | Absent                        | Absent                        | Absent                        | Absent                        |
| <i>Spillover Parking</i>                                              | Paved with pervious materials | Paved with pervious materials | Paved with pervious materials | Paved with pervious materials |
| <i>Landscaping</i>                                                    | Required                      | Required                      | Absent                        | Required                      |
| Cluster Development                                                   | Encouraged                    | Encouraged                    | Encouraged                    | Allowed for Older People Only |
| Consolidated Open Spaces within Subdivisions                          | Required                      | Required                      | Absent                        | Required                      |
| Natural Open Space Management Minimums within Subdivisions            | Absent                        | Required                      | Absent                        | Required                      |
| Specific Allowable Uses within Open Space                             | Required                      | Required                      | Required                      | Required                      |
| Sidewalks                                                             |                               |                               |                               |                               |
| <i>Both Street Sides</i>                                              | Absent                        | Absent                        | Absent                        | Absent                        |
| <i>Minimum Width</i>                                                  | 5 feet                        | 5 feet                        | 5 feet                        | Absent                        |
| <i>Trail Substitutions</i>                                            | Absent                        | Allowed                       | Allowed                       | Allowed                       |
| Single Family Driveways                                               |                               |                               |                               |                               |
| <i>Pervious Materials</i>                                             | Allowed                       | Allowed                       | Allowed                       | Absent                        |
| <i>Two-track Designs</i>                                              | Absent                        | Allowed                       | Allowed                       | Absent                        |
| <i>Shared Driveways</i>                                               | Absent                        | Prohibited                    | Allowed                       | Prohibited                    |
| Rooftop Discharges into Yards                                         | Allowed                       | Allowed                       | Allowed                       | Allowed                       |
| <b>EROSION AND SEDIMENT CONTROLS</b>                                  |                               |                               |                               |                               |
| Controls used in the past 3 years                                     |                               |                               |                               |                               |
| <i>silt fences</i>                                                    | Yes                           | Yes                           | Yes                           | Yes                           |
| <i>straw bales</i>                                                    | Yes                           | Yes                           | Yes                           | Yes                           |
| <i>construction sequencing</i>                                        | Yes                           | Yes                           | No                            | Yes                           |
| <i>construction phasing</i>                                           | Yes                           | Yes                           | Yes                           | No                            |
| <i>preservation and non-disturbance of natural vegetation</i>         | Yes                           | Yes                           | Yes                           | Yes                           |
| <i>preservation and non-disturbance of stream and wetland buffers</i> | Yes                           | Yes                           | Yes                           | Yes                           |
| <i>stair-step grading</i>                                             | No                            | Yes                           | No                            | No                            |
| <i>temporary seeding and mulching</i>                                 | No                            | Yes                           | Yes                           | Yes                           |
| <i>permanent seeding and mulching</i>                                 | No                            | Yes                           | Yes                           | Yes                           |
| <i>dust control</i>                                                   | No                            | Yes                           | Yes                           | No                            |

**Table 11: Watershed Audit Findings and Comparisons for Hudson, Nashua, Merrimack, and Litchfield**

| <b>Mechanism and Activity</b>                                 | <b>Nashua</b>                  | <b>Hudson</b> | <b>Merrimack</b>                                  | <b>Litchfield</b>                  |
|---------------------------------------------------------------|--------------------------------|---------------|---------------------------------------------------|------------------------------------|
| <i>erosion blankets and geotextiles</i>                       | Yes                            | Yes           | Yes                                               | Yes                                |
| <i>fiber rolls</i>                                            | No                             | Yes           | Yes                                               | No                                 |
| <i>temporary stream crossings</i>                             | Yes                            | Yes           | Yes                                               | No                                 |
| <i>stabilized construction entrances</i>                      | No                             | Yes           | Yes                                               | Yes                                |
| <i>exit tire wash</i>                                         | No                             | Yes           | No                                                | No                                 |
| <i>energy dissipation at pipe outlets</i>                     | No                             | Yes           | Yes                                               | No                                 |
| <i>check dams in natural or manmade channels</i>              | Yes                            | Yes           | Yes                                               | Yes                                |
| <i>sand/gravel bag barriers</i>                               | No                             | Yes           | Yes                                               | No                                 |
| <i>brush or rock filters</i>                                  | No                             | Yes           | Yes                                               | No                                 |
| <i>storm drain inlet protection</i>                           | Yes                            | Yes           | Yes                                               | No                                 |
| <i>catch basin inlet filters</i>                              | Yes                            | Yes           | Yes                                               | Yes                                |
| <i>sedimentation basins</i>                                   | No                             | Yes           | No                                                | No                                 |
| <i>sediment traps</i>                                         | No                             | Yes           | Yes                                               | Yes                                |
| <i>filtration of dewatering operations</i>                    | No                             | Yes           | Yes                                               | No                                 |
| <i>secondary filtration</i>                                   | No                             | Yes           | Yes                                               | No                                 |
| <i>dikes or berms</i>                                         | No                             | Yes           | Yes                                               | No                                 |
| <i>pipe slope drains to bypass erodible soils</i>             | No                             | Yes           | No                                                | No                                 |
| <i>stockpile stabilization</i>                                | Yes                            | Yes           | Yes                                               | Yes                                |
| Inspections                                                   |                                |               |                                                   |                                    |
| <i>responsible party</i>                                      | Planner                        | Inspector     | Public Works Engineer                             | Planning Board Consulting Engineer |
| <i>schedule</i>                                               | As needed, generally quarterly | Weekly        | Weekly or Bi-monthly depending on site difficulty | (Contained in stormwater plan)     |
| Erosion and Control Plan                                      | Required                       | Required      | Required                                          | Required                           |
| Training Opportunities                                        | No                             | Yes           | No                                                | No                                 |
| Violations Enforcement                                        |                                |               |                                                   |                                    |
| <i>Fines</i>                                                  | No                             | Yes           | No                                                | Yes                                |
| <i>Injunctions, Cease and Desist Orders, stop work orders</i> | No                             | Yes           | Yes                                               | Yes                                |
| <i>Board/Commission Review</i>                                | No                             | Yes           | No                                                | No                                 |
| <i>Withholding Certificate of Occupancy or Road Bond</i>      | No                             | No            | Yes                                               | No                                 |
| <i>EPA Notification</i>                                       | Yes                            | No            | No                                                | No                                 |

| <b>Table 11: Watershed Audit Findings and Comparisons for Hudson, Nashua, Merrimack, and Litchfield</b> |                                                                                |                                                                                  |                                                                                                                                           |                                                                                    |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Mechanism and Activity</b>                                                                           | <b>Nashua</b>                                                                  | <b>Hudson</b>                                                                    | <b>Merrimack</b>                                                                                                                          | <b>Litchfield</b>                                                                  |
| <b>STORMWATER MANAGEMENT (PHASE II COMMUNITIES)</b>                                                     |                                                                                |                                                                                  |                                                                                                                                           |                                                                                    |
| Management Systems                                                                                      | Storm sewers, some CSOs remaining                                              | Storm sewers and open channels                                                   | Storm sewers and open channels                                                                                                            | Storm sewers and open channels                                                     |
| Top Three Management Practices                                                                          | 1) Subsurface infiltration units<br>2) Treatment basins<br>3) Vortechinics     | 1) Silt fences and straw bales<br>2) Infiltration systems<br>3) recharge systems | 1) Reports and recommendations<br>2) On-site retention and infiltration<br>3) Natural swale or wetland retention to discourage sheet flow | 1) Catch basins<br>2) Silt fences and check dams<br>3) detention / retention ponds |
| Stormwater Management Plan at Site Plan Review                                                          | Required                                                                       | Required                                                                         | Required                                                                                                                                  | Required                                                                           |
| Inspection During Construction                                                                          | Required                                                                       | Required                                                                         | Required                                                                                                                                  | Required                                                                           |
| Maintenance Responsibilities                                                                            | Private Owner                                                                  | Private Owner, Municipality, HOA, or Developer                                   | Municipality                                                                                                                              | Private Owner, Municipality, or HOA                                                |
| Violations Penalties                                                                                    | NH RSA 676:17: (Initial fine of \$275 and a daily fine of \$550/day/violation) | Fines and revocations of permits                                                 | Notification to EPA to issue a \$32,000 per day fine                                                                                      | Enforcements contained within individual approvals                                 |
| <b>NON-STORMWATER DISCHARGES</b>                                                                        |                                                                                |                                                                                  |                                                                                                                                           |                                                                                    |
| Sanitary Waste Management                                                                               | Centralized wastewater treatment plant                                         | Centralized wastewater treatment plant and individual septic systems             | Centralized wastewater treatment plant and individual septic systems                                                                      | Individual subsurface disposal systems and leach fields                            |
| Septic System Maintenance Regulations                                                                   | Yes                                                                            | Yes                                                                              | No                                                                                                                                        | No                                                                                 |
| Required inspections of privately owned septic systems                                                  | Yes                                                                            | No                                                                               | No                                                                                                                                        | Yes                                                                                |
| Municipal Spill Response Plans                                                                          | Yes                                                                            | Yes                                                                              | Yes                                                                                                                                       | Yes                                                                                |
| Deicing Systems                                                                                         | Sand and Road Salt                                                             | Sand and Road Salt                                                               | Sand, Road Salt, and Calcium Chloride                                                                                                     | Sand                                                                               |
| Municipal Salt Storage Facility                                                                         | Yes                                                                            | Yes                                                                              | Yes                                                                                                                                       | Yes                                                                                |

| Mechanism and Activity                            | Nashua                      | Hudson                                          | Merrimack | Litchfield |
|---------------------------------------------------|-----------------------------|-------------------------------------------------|-----------|------------|
| WATERSHED STEWARDSHIP PROGRAMS                    |                             |                                                 |           |            |
| Stream Restoration Projects                       | Yes                         | Yes                                             | No        | No         |
| Pet Waste Management Ordinance                    | Yes                         | Yes                                             | No        | Yes        |
| Street Sweeping                                   | Weekly<br>March - September | Annually<br>(Downtown swept 3-4 times per year) | As needed | Annually   |
| Use of Fertilizers and Pesticides on Public Lands | Yes                         | No                                              | Yes       | Yes        |

*Notes:*

*Absent = Conservation program not in place.*

*Encouraged = Conservation program encouraged, but not mandated in all cases.*

*Required = Conservation program required.*

*Progressive = Conservation requirements or local programs operate at levels higher than State or Federal mandates.*

### 4.3 Existing Land Uses

Land uses provide a general classification of activities that are loosely organized around the prescribed zoning of a particular area. Land uses are often more intuitive ways of viewing development patterns than zoning, since most everyone can relate to residential, commercial, and industrial uses, whereas zoning is strictly codified, and is therefore described differently between towns and is not readily comparable. General land uses within the quarter-mile river corridor for each of the towns is quantified in Table 12, and are illustrated in Figures 8A and 8B.

**Table 12: Existing Land Use Types in the Lower Merrimack River Corridor.**

| Land Use           | Merrimack |       | Litchfield |       | Nashua |       | Hudson |       | Corridor Total |       |
|--------------------|-----------|-------|------------|-------|--------|-------|--------|-------|----------------|-------|
|                    | Acres     | %     | Acres      | %     | Acres  | %     | Acres  | %     | Acres          | %     |
| Agriculture        | 0         | 0.0%  | 579.3      | 36.8% | 0      | 0.0%  | 15.9   | 1.1%  | 595.2          | 9.6%  |
| Commercial         | 62.5      | 3.8%  | 15.8       | 1.0%  | 139.2  | 8.8%  | 20.3   | 1.5%  | 237.8          | 3.8%  |
| Industrial         | 393.7     | 23.9% | 0          | 0.0%  | 235.9  | 14.9% | 265.2  | 19.2% | 894.8          | 14.5% |
| Institutional      | 0.3       | 0.0%  | 14.8       | 0.9%  | 0      | 0.0%  | 3.2    | 0.2%  | 18.3           | 0.3%  |
| Residential        | 224.4     | 13.6% | 320.8      | 20.4% | 257.4  | 16.3% | 458.8  | 33.1% | 1,261.4        | 20.4% |
| Mixed use          | 21.1      | 1.3%  | 11.6       | 0.7%  | 0      | 0.0%  | 0      | 0.0%  | 32.7           | 0.5%  |
| Municipal Facility | 62.7      | 3.8%  | 4.6        | 0.3%  | 28     | 1.8%  | 8.9    | 0.6%  | 104.2          | 1.7%  |
| Open Space         | 96.4      | 5.8%  | 64.7       | 4.1%  | 0      | 0.0%  | 15.4   | 1.1%  | 176.5          | 2.9%  |
| Recreational       | 0.7       | 0.0%  | 71.1       | 4.5%  | 111.5  | 7.0%  | 173.4  | 12.5% | 356.7          | 5.8%  |
| Roadways           | 101       | 6.1%  | 50         | 3.2%  | 287.6  | 18.2% | 113.4  | 8.2%  | 552            | 8.9%  |
| Right-of-Way       | 11.5      | 0.7%  | 0          | 0.0%  | 47.1   | 3.0%  | 0.6    | 0.0%  | 59.2           | 1.0%  |

**Table 12: Existing Land Use Types in the Lower Merrimack River Corridor.**

| Land Use              | Merrimack      |       | Litchfield     |       | Nashua         |       | Hudson         |       | Corridor Total |       |
|-----------------------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|
|                       | Acres          | %     | Acres          | %     | Acres          | %     | Acres          | %     | Acres          | %     |
| School                | 0              | 0.0%  | 14.4           | 0.9%  | 9.9            | 0.6%  | 2.8            | 0.2%  | 27.1           | 0.4%  |
| Vacant                | 411.7          | 25.0% | 191.7          | 12.2% | 221.5          | 14.0% | 70.9           | 5.1%  | 895.8          | 14.5% |
| Water                 | 262.8          | 15.9% | 235.9          | 15.0% | 244.3          | 15.4% | 235.6          | 17.0% | 978.6          | 15.8% |
| <b>Total Corridor</b> | <b>1,648.8</b> |       | <b>1,574.7</b> |       | <b>1,582.4</b> |       | <b>1,384.4</b> |       | <b>6,190.3</b> |       |

The character of each of the towns may partially be captured by the land uses which have the highest contributing percentages: Merrimack's land uses are predominated by both vacant land and industrial uses; agriculture makes up the highest percentage of land use in Litchfield; Nashua has relatively even and high percentages of industrial, residential, and roadway uses; and the bulk of Hudson's area is predominated by residential uses. For the region as a whole, residential uses make up the largest percent land area, at 20.4 percent.

At smaller scales, and particularly for the river corridor itself, zoning can be a useful tool to allow prediction of future land uses and conditions based on current municipal regulations. While regulatory standards may fluctuate over time, zoning amendments are generally heavily scrutinized and publicly reviewed, and therefore zoning remains a feature which may be reasonably predictable. The corridor zoning requirements are illustrated in Figures 10A and 10B.

#### 4.4 Issues Summary

The following sections discuss the status of the Lower Merrimack River corridor in relation to the overall management goals identified in Chapter 2 of this management plan. These issues will then be transformed into recommendations appearing in Chapter 5. In essence, these identified issues provide guidance on the actual studies, activities, or processes that would be useful in supporting the overall goal of preserving the character and integrity of the Merrimack River.

Insert  
Figure 10A - Zoning Map (North)

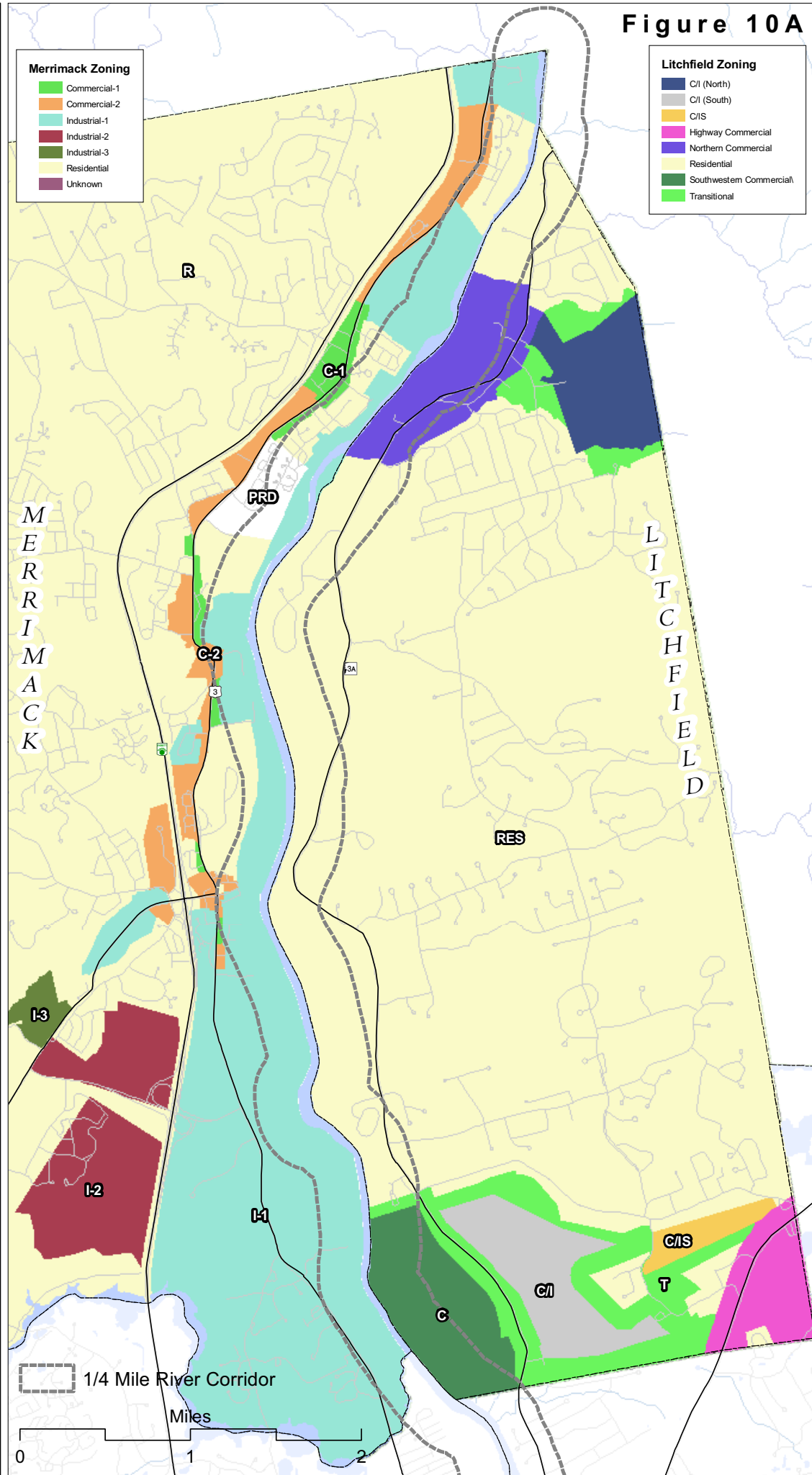
Scroll Down for Figure 10A

# Lower Merrimack River Corridor Plan Zoning Map

Figure 10A

- Merrimack Zoning**
- Commercial-1
  - Commercial-2
  - Industrial-1
  - Industrial-2
  - Industrial-3
  - Residential
  - Unknown

- Litchfield Zoning**
- C/I (North)
  - C/I (South)
  - C/IS
  - Highway Commercial
  - Northern Commercial
  - Residential
  - Southwestern Commercial
  - Transitional



Maps prepared by the Nashua Regional Planning Commission are for planning purposes only. NRPC uses data gathered from multiple sources at various scales of accuracy. No warranties, expressed or implied, are provided for the data herein, its use, or its interpretation.



Prepared by NRPC GIS, May 2007  
Project Location: J:\GIS\Projects\2006 Merrimack\_River\_06 report\report\_line\plains.mxd

Insert  
Figure 10B – Zoning Map (South)

Scroll Down for Figure 10B



#### **4.4.1 Administration**

Processes and administration of corridor-related issues and permits are handled differently in each corridor community, which can be problematic for issues that have trans-jurisdictional effects or implications since there is no oversight agency or group for day-to-day activities occurring within the river corridor. There is potential for increased coordination of violations tracking, enforcement, and permitting opportunities, perhaps through the local Conservation Commissions and the Lower Merrimack River Local Advisory Committee. The Corridor Management Plan itself can serve as a unifying resource if incorporated into municipal Master Plans, giving each town a common basis for making recommendations and pursuing actions that promote wise use of the corridor. The DES One-Stop Database found at <http://www.des.nh.gov/OneStop.htm> is a resource that tracks permit information. It could also prove invaluable not only for understanding the cumulative effects of incremental developments but also for increasing public involvement in the management of corridor resources and concerns.

Citizens can always report potential violations through the DES Wetlands Bureau via a form on their website at <http://www.des.nh.gov/Wetlands/pdf/complain.pdf>. Also, since each of the municipalities already has policy, personnel, and a regulatory framework that works well individually, there is strength to be built upon in the efforts of arranging collective management of the overall corridor, both in violations reporting and enforcement.

#### **4.4.2 Conservation**

While each of the communities has tools available to help in permanently protecting important land or resource areas, dedication of permanently protected open space is still a difficult hurdle for the corridor communities. Land values continue to escalate which means that communities are finding it increasingly difficult to purchase large parcels of land outright, and need to step-up partnering efforts. As such, there is also a need to implement conservation on a smaller scale, using innovative methods which right now are only encouraged in the corridor communities rather than required. Conservation subdivisions, smaller or shared access, and innovations in stormwater controls are all methods which have the ability to incrementally preserve undeveloped land, yet they are often misunderstood and require education of both municipal professionals and the general public to implement these methodologies on a wider scale. In some cases, these methodologies are not even allowed under existing zoning or developers are not given enough incentive to work for more efficient designs given the education curve necessary at the permit approval stage.

#### **4.4.3 Corridor Management**

Management of the Merrimack River is mainly controlled by the existing regulatory framework contained within the corridor communities, consisting of regulations, ordinances, and permitting approvals. It is apparent that each of the corridor communities has made strides toward better protection of the corridor resource; however, critical pieces of regulatory oversight are sometimes still lacking, or when in place, there is a lack of enforcement or long-term evaluation of protective measures. None of the four corridor communities have adopted erosion control standards or watershed protection measures within their zoning ordinances, making it difficult to regulate activities or disturbances that occur to already developed properties within the corridor. In addition, only Merrimack has adopted a zoning ordinance which regulates development within the shoreland area.

The watershed audits also reveal that the protective measures afforded to the river throughout the corridor vary widely between communities, which may have the unintended consequence of encouraging developments to occur in places which have the least control or influence over it.

#### **4.4.4. Historic Resources**

All four communities in the river corridor actively protect historic resources, though information on the Lower Merrimack River corridor as a collective resource has not yet been officially recognized. There is room, and need, for more active protection of historic resources along the Merrimack River which may have the combined effect of contributing to overall recreation, open space, or wildlife habitat protection goals at the same time.

#### **4.4.5 Public Access and Awareness**

Public access to the river resource continues to be a matter of concern from both quantity and quality standpoints. An increased public presence allows for both increased appreciation and potential degradation of the river corridor, so recreational uses of the river environment need to be carefully managed and directed. Currently, there are few public access points to the river, and those that are available are not well publicized or known, some contain structural deficiencies in terms of facilities, parking, and maintenance, and some are not well patrolled (either formally or informally) allowing inappropriate activities or vandalism to persist. However, the Merrimack River itself is a much beloved resource that is still a “diamond in the rough.” An increased number of attractive and well-managed facilities will help to promote even greater appreciation of the river corridor by a wider, environmentally conscious audience.

#### **4.4.6 Restoration**

Each of the corridor communities have made increasing efforts towards effectively regulating new developments with riparian resource considerations in mind, but it is somewhat more difficult to regulate existing uses and even more difficult to achieve rehabilitation or restoration of existing structures that do not violate any existing standards but do represent outdated or no longer permitted designs. Outfalls and streambank stabilization structures along the Merrimack River corridor range in design and condition and many are problematic in the degree to which they accommodate riparian interests either in terms of materials, velocity of discharge, height, landscaping, or aesthetic concerns. Communities will need to use a variety of voluntary and involuntary approaches to achieving restoration of outdated, unsafe, or incompatible structures.

#### **4.4.7 Scenic Quality**

While hard to define, scenic quality is an important resource that remains largely ignored, in that structural heights and screening standards are the same for either upland or riparian properties. Viewsheds from the river are not currently protected, and viewsheds to the river from individual homes are often in violation of the State Comprehensive Shoreland Protection Act but are not enforced.

#### **4.4.8 Water Quality**

The Lower Merrimack River corridor has enjoyed over 20 years of continuous water quality field data, however, sophisticated water quality testing for a variety of water quality contaminants is both laborious and expensive and is currently lacking. As development pressure increases along the corridor, water quality issues will also change. Dedicated volunteers and funds will be necessary to guarantee that monitoring data remains current and relevant to changing contaminant issues. In addition, regulatory frameworks lack the rigor needed to address a full spectrum of water quality issues ranging from road salt applications to aquifer protections to erosion control. Standards for regulating the cumulative effects of smaller developments are currently absent within the corridor community towns, and will become increasingly necessary as infill of developments and retrofitting of existing sites become more common.

In addition, water quality improvements may only be achievable when the full spectrum of upstream and downstream uses and impacts are considered at a variety of government levels, and additional partnering may be needed with entities having jurisdiction primarily outside of the corridor area.

#### **4.4.9 Water Quantity**

As population and demand for river uses continues to increase, the flexibility for water users to persist or expand will continue to decrease. Consumptive uses of surface waters are in direct conflict with other uses, and the adjacent communities need additional information in order to fully understand the degree to which these competing uses can be accommodated. As a primarily drinking water resource for over 80,000 residents in the Nashua region (via Pennichuck Water Works) understanding the demand for and allocation of surface waters is important, and will only continue to increase in need and importance as the population continues to change and grow.

#### **4.4.10 Wildlife and Aquatic Habitats**

As development pressure in riparian lands and aquatic habitats continue to increase, the need to protect these habitats for fish and wildlife populations will also increase if we are to maintain viable populations of water-dependent habitats and species. Currently, only Litchfield regulates the development of critical habitat areas, and language is entirely absent from both Nashua and Merrimack's land use ordinances. Maintaining up-to-date Natural Resource Inventories within the corridor communities will help guide decision-makers when considering the needs of fisheries and wildlife. This is the first step toward adopting regulations which actively protect these resources.

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